इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 1448-136 (1991): Methods of test for petroleum and its products, Part 136: Determination of loss of lubricating oils (Noak's Method) [PCD 1: Methods of Measurement and Test for Petroleum, Petroleum Products and Lubricants]

"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

BRUTUM FULMEN
IGNORANTIA JURIS NON EXCUSAT
PROTECTED BY COPYRIGHT

IS 1448 [P : 136] : 1991
(Reaffirmed 2003)

भारतीय मानक

पेट्रोलियम और इसके उत्पादों की परीक्षण पद्धति

[पी : 136]

स्नेहन तेलों की वाष्पन क्षति ज्ञात करना (नोआक्स पद्धति)

Indian Standard

METHODS OF TEST FOR PETROLEUM AND ITS PRODUCTS

[P : 136]

DETERMINATION OF EVAPORATION LOSS OF LUBRICATING OILS (NOACKS METHOD)

UDC 665·6 : 66·046·72 : 621·892

© BIS 1991

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

March 1991

Price Group 2

Methods of Test for Petroleum, Petroleum Products and Lubricants Sectional Committee, PCD 1

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Methods of Test for Petroleum, Petroleum Products and Lubricants Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

Indian Standard

METHODS OF TEST FOR PETROLEUM AND ITS PRODUCTS

[P : 136]

DETERMINATION OF EVAPORATION LOSS OF LUBRICATING OILS (NOACKS METHOD)

Adapted from DIN Method 51581 : 1983 "Testing of lubricants; determination of evaporation loss of lubricating oils; noacks test".

1 SCOPE

1.1 This standard prescribes a procedure for the determination of evaporation loss in automotive engine lubricants at temperatures up to 350°C.

2 SUMMARY OF METHOD

2.1 The test sample of the oil is heated in the testing apparatus and maintained at the testing temperature for 1 hour. The resulting oil vapours are drawn off by a stream of air produced by a constant reduced atmospheric pressure. The evaporation crucible with the oil is weighed before and after heating. From the difference the evaporation loss is obtained. In general (particularly for motor oils) the testing temperature is 250°C.

3 SIGNIFICANCE AND USE

3.1 The evaporation loss is of particular importance in motor and cylinder lubrication. With high temperatures encountered a high evaporation loss may tantamount to an increased oil consumption and may lead to a change in the properties of the oil.

4 TERMINOLOGY

4.1 Evaporation Loss

It is defined as the reduction in mass of the oil in percent occuring under the conditions of this test method.

5 APPARATUS

5.1 As shown in Fig. 1 and shall consist of the following.

5.1.1 *Evaporation Crucible with Lid*

The crucible is made of stainless steel. Above the support ring the thread for the lid is cut. The lid of nickel-plated brass forms an air-tight closure with the crucible by means of an interior, tapered sealing surface. Three jets of hardened steel let into the lid allow the air to flow in. The suction tube bent downwards, is connected with the lid in its centre by a screw fitting and is properly sealed (*see* Fig. 2).

5.1.2 *Electrical Heating Block*

The heating block is made from a malleable aluminium alloy sheet (pressed free of shrink holes) and is insulated at the jacket and base against loss of heat. The block is heated electrically by the base and jacket heating system having a total power consumption of 1 to 1·2 kW. In this respect the difference between both the individual power consumptions should not exceed 0·15 kW. In the centre of the heating block there is a circular recess to take the evaporation crucible, the space between the block and crucible being filled in with wood's alloy. Three catches on the block prevent the crucible from rising in the metal bath. Two additional circular recesses at equal intervals from the centre of the block are provided for the thermometers. One of these recesses takes the measuring thermometer, the second recess is for the contact thermometer (*see* Fig. 3).

5.1.3 *Wood's Alloy*

Easily meltable alloy melting point approximately 75°C.

5.1.4 *Thermometers*

Contact thermometer with a maximum measuring range of 200°C (for example from 200 to 400°C), sealed in 1/1 degrees and with a tube length of at least 60 mm.

5.1.5 *Measuring Thermometer*

Calibrated thermometers with the following range shall be used:

Measurements °C	Range °C
Below 200	40 to 260
200 and over	190 to 410

5.1.6 *Relay Switch*

Suitable relay for controlling the temperature (For example heated wire-vacuum relay, mercury or nickel silver relay).

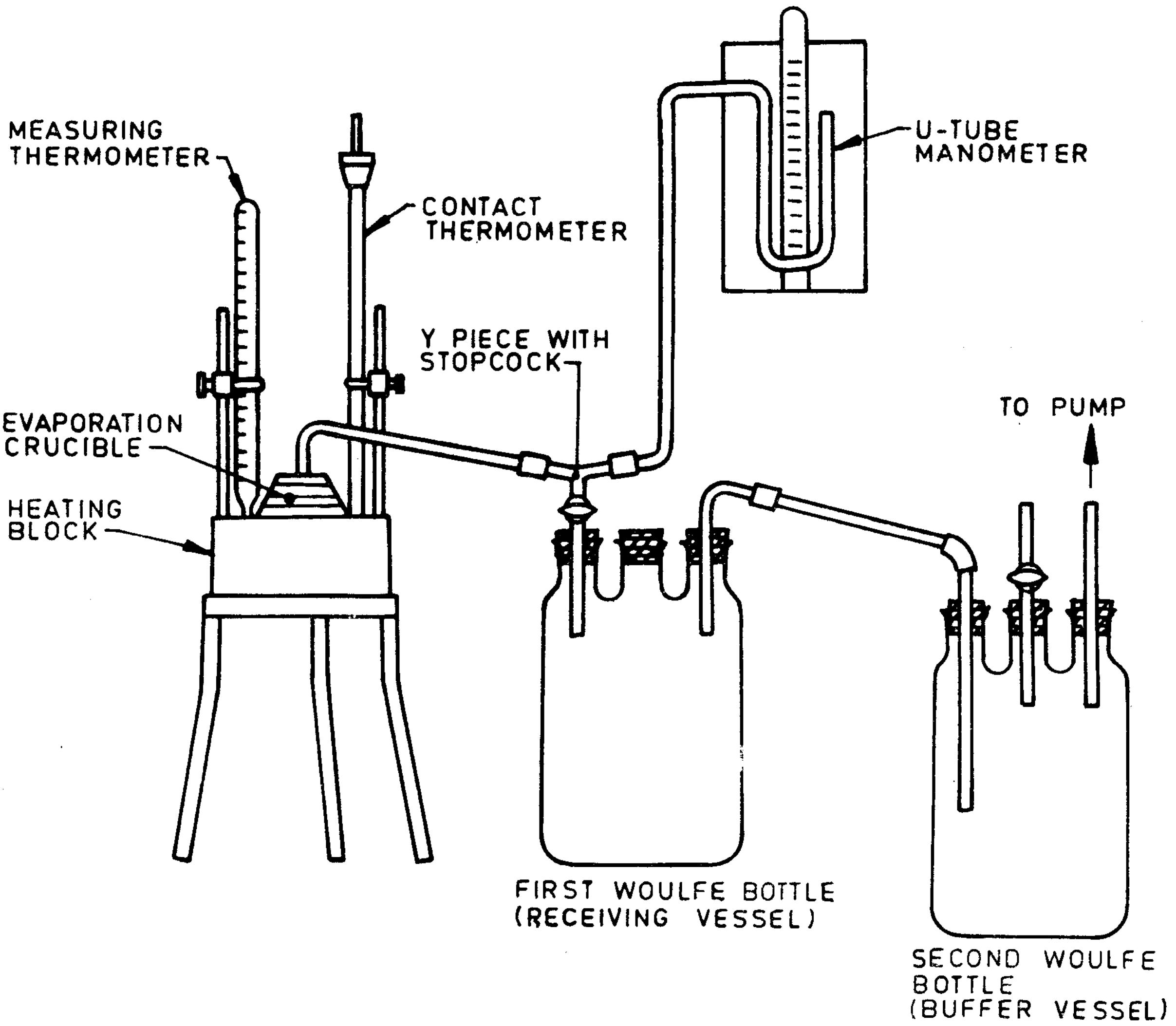


FIG. 1 TESTING APPARATUS FOR DETERMINING THE EVAPORATION LOSS OF LUBRICATING OILS

5.1.7 *Series Resistance*

The series resistance shall be regulated and capable of carrying a sufficient load. It is advisable to use a slide rheostat of 80 ohms which can take a load of up to 5 amperes.

5.1.8 *Wulff Bottle*

5.1.9 *Fork Piece with Stop-cock*

Fork piece of glass tubing, 4 mm internal diameter. The upright arms (each 45 mm in length) should form an angle so that the arm to the suction tube of the crucible and the suction tube itself form a straight line. Vertical arm 60 mm long, 20 mm below the point of attachment of the vertical arm there is a one-way stop-cock. The glass tube protruding into the Wulff bottle (and the glass tube to the buffer bottle) should be tapered at the end.

5.1.10 *Water Jet Vacuum or Oil Pump*

5.1.11 *U Tube Pressure Gauge*

5.1.12 *Rubber Tubing*

4 mm internal diameter, 40 mm long, 5 mm internal diameter, 220 mm long.

5.1.13 *Buffer Bottle*

3-litre capacity.

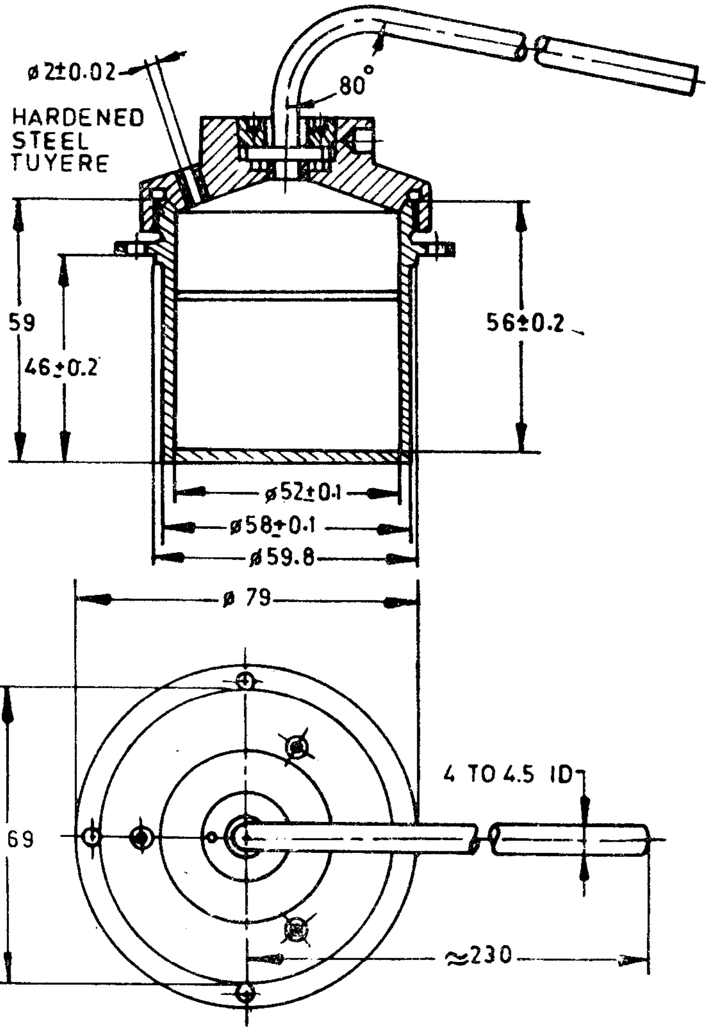
5.1.14 *T-Piece with Tube and Tube Clip*

6 PREPARATION OF APPARATUS

6.1 In the recess of the heating block, which shall later take the crucible, sufficient Wood's alloy is added for the latter to be on a level with the upper edge of the recess after the evaporation crucible has been inserted. Both the thermometer recesses are filled in the same manner with Wood's alloy.

6.2 The heating block in heated on full power.

6.3 As soon as the Wood's alloy has melted both the thermometers are inserted in their respective recesses so that the bulbs of the thermometers touch the base. The desired testing temperature is set on the contact thermometer and read off from the calibrated measuring thermometer.



All dimensions in millimetres.

FIG. 2 EVAPORATION CRUCIBLE

6.4 65 ± 2 g oil is weighed out to an accuracy of 0·05 g into the evaporation crucible without its lid. Before screwing on the lid the jets in it should be examined to ensure that they are not blocked (for example with a 2 mm reamer or drill) and that the diameter of the bore is maintained at 2 mm. The lid is then tightened with a spanner. The internal diameter of the suction tube may become reduced due to mechanical deformation, film formation and carbon residues. It should therefore, be tested by ensuring that a ball of 3·5 mm diameter runs through freely (*see also* **7.5**).

6.5 The U tube pressure gauge shall be adjusted to the zero setting before carrying out the analysis and be joined to the fork piece by means of the 220 mm long tubing.

6.6 The 40 mm long tubing is pushed on to the other end of the fork piece and is used for connection to the suction tube of the crucible, which should be connected joint to joint with the glass tube. The vertical arm of the fork piece protrudes through a rubber stopper into the Wulff bottle. The glass stop-cock of the fork piece should be closed.

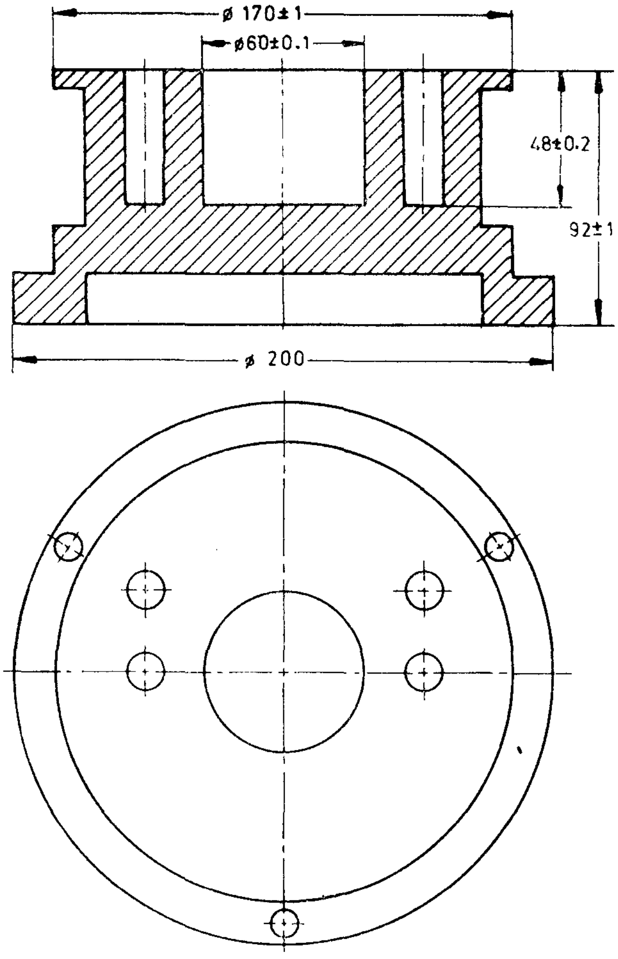
6.7 The buffer bottle is arranged between the Wulff bottle and the pump for buffering purposes.

6.8 When using strong pumps it is advisable to insert, between pump and buffer bottle, a *T* piece with tube and tube clip with which an additional stream of air can be produced to limit the suction effect.

6.9 The apparatus should be set up in a position where it is free from draughts.

7 PROCEDURE

7.1 After preparing the evaporation crucible it is placed in the heating block as soon as the measuring thermometer indicates the test temperature set. The crucible should be secured by the three catches. The suction tube of the crucible is connected with the fork piece and the pump started up. By opening the stop-cock on the fork piece slowly and regulating the auxiliary stream of air from the *T* piece in the suction line a reduced pressure of 20 mm ± 1 mm water gauge is adjusted and maintained at a constant level for the duration of the test. The series resistance



All dimensions in millimetres.

FIG. 3 HEATING BLOCK

remains switched off until the temperature, which has sunk by about 10°C on inserting the crucible, has again risen to 5°C below the test temperature. Not more than 5 to 6 minutes should be required to reach the test temperature again. The resistance should then be switched on again sufficiently to maintain the test temperature. The position of the series resistance should be marked in a suitable manner.

7.2 The test temperature should be maintained to ± 1°C at a constant level.

7.3 The duration of the test is 60 minutes ± 1 minute. It begins with the opening and ends with the closing of the stop-cock on the fork piece.

7.4 After conclusion of the analysis the tubing is disconnected from the suction tube of the crucible and the crucible is lifted out carefully. Any Wood's alloy adhering to it is removed with a brush or a folded cloth and returned to the heating block. Care should be taken to see that the crucible is not tilted too heavily. After cooling the crucible is reweighed without its lid. The thermometers should be removed before the Wood's alloy solidifies.

7.5 For removing residues of oil and, to a lesser degree, carbon residues too, it is advisable to place the crucible, lid and delivery tube in a sufficiently large vessel containing benzene for at least half an hour after each test. Carbon residues which are not removed in this manner shall have to be dislodged from time to time mechanically, for example, by rubbing with a pad of cotton wool dipped in benzene and using very fine corundum powder.

8 CALCULATION

8.1 Evaporation loss, percent by mass

$$= \frac{M_1 - M_2}{M_1} \times 100$$

where

M_1 = mass, in g, before the test, and

M_2 = mass, in g, after the test.

9 REPORT

9.1 Report the result as evaporation loss, percent by mass up to one decimal place together with the test temperature in °C.

10 PRECISION

10.1 Results of duplicate test shall not differ by more than the following:

Evaporation Loss percent by Mass	*Repeatability*	*Reproducibility*
Up to 10	± 0·5 percent by mass	± 1·0 percent by mass
Above 10	± 5 percent of the mean value	± 10 percent of the mean value

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Revision of Indian Standards

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference:

Doc : No. PC 1 (843)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices:	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	331 01 31 331 13 75
Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola CALCUTTA 700054	37 86 62
Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036	53 38 43
Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113	41 29 16
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) BOMBAY 400093	6 32 92 95

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. PATNA. SRINAGAR. THIRUVANANTHAPURAM.

Printed at Printrade, New Delhi, India